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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/829,306

04/20/2004

Shinsuke Fujiwara

4685

5680

21553 7590 04/23/2007
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EXAMINER

ARENA, ANDREW OWENS

ART UNIT

PAPER NUMBER

2811

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/23/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/829,306

Applicant(s)

FUJIWARA ET AL.

Examiner

Andrew O. Arena

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 11-15, 26 and 27 is/are pending in the application.
- 4a) Of the above claim(s) 2, 7, 14 and 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-6, 11-13, and 26-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>Jan 12 2007 & Jan 22 2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Claims 2, 7, 14, and 15 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 06/24/2005 (Applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, election treated as without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action (dated 01/26/2006).

Claims 1, 3-6, 11, 13 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Migita (US 5,299,217) in view of Asryan (US 6,870,178) and Duggan (US 5,747,827).

Regarding claim 1, Migita discloses (Fig 7) a semiconductor light emitting device of II-VI group compound semiconductor (col 2 ln 48-55) formed on a compound semiconductor substrate (ZnSe: col 3 ln 48) and comprising an active layer (22) between an n-type cladding layer (21) and a p-type cladding layer (23; col 7 ln 35-37).

Migita differs from the claimed invention only in not disclosing a barrier layer.

Asryan discloses (Fig 8) a semiconductor light emitting device of a compound semiconductor comprising an i-type semiconductor barrier layer (116; col 4 ln 21)

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consisting of a single monolayer of an i-type semiconductor material (col 13 ln 39-42: Table II indicates only the cladding layers are doped) having a band gap larger than a band gap of a p-type cladding layer (Fig 8 and Table I in col 13), provided between an active layer (110) and a p-type cladding layer (122).

Duggan discloses a semiconductor light emitting device of a compound semiconductor, teaches II-VI and III-IV systems are art-equivalents suitable for blue LEDs and LDs (col 1 ln 12-13, col 4 ln 44-46 & 66, col 5 ln 1-2), and teaches (Fig 23) a barrier layer (58) between and respectively directly in contact with an active layer (62) and a p-type cladding layer (64) in a II-VI-based light emitting device (col 11 ln 9-14).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Migita in view of Asryan and Duggan to further comprise an i-type semiconductor barrier layer consisting of a single monolayer of an i-type semiconductor material having a band gap larger than a band gap of said p-type cladding layer, provided between said active layer and said p-type cladding layer; at least to suppress electron overflow (Duggan: col 11 ln 29).

Regarding claim 3, Migita as modified above differs from the claimed invention only in not expressly disclosing the magnitude of said band gap difference.

Asryan discloses (Table I, col 13) the claimed band gap difference.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that the magnitude of the band gap of said barrier layer is larger by 0.05 eV than the band gap of said p-type cladding layer; at least use a known and suitable magnitude.

Regarding claim 4, Migita as modified above differs from the claimed invention only in not expressly disclosing the energy band diagram.

Asryan discloses (Fig 8) the claimed energy band relationships.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that in the band gap of said barrier layer, energy of valence band (808) is approximately the same as or higher than that (182 at 126 in layer 122) of said p-type cladding layer, and energy of conductive band (804) is larger than that (182 at 124 in layer 122) of said p-type cladding layer; at least to use a known and suitable energy band relationship.

Regarding claims 5 & 6, Migita as modified above discloses said barrier layer is of a II-VI group semiconductor.

Migita as modified above differs from the claimed invention only in not expressly disclosing the material of the barrier layer.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the barrier layer using ZnMgBeSe; at least to use a known and suitable material.

Regarding claim 11, Migita discloses said p-type cladding layer is ZnCdS.

Migita as modified above differs from the claimed invention only in not disclosing said p-type cladding includes Mg and Se.

Duggan teaches the use of II-VI compounds including Zn, Mg, S, and Se such as ZnSeS-MgSSe.

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It would have been obvious to a person having ordinary skill in the art at the time the invention was made that said p-type cladding layer is formed of ZnCdMgSSe; at least to use a known and suitable material.

Regarding claim 13, Migita discloses (Fig 3) an n-type ZnSe single crystal substrate is used as said compound semiconductor substrate (col 2 ln 48-50).

Regarding claim 26, Migita as modified above discloses said cladding layers, said active layer, and said i-type semiconductor material of said barrier layer each respectively comprise a respective group II-VI compound semiconductor material

Claims 12 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Migita as modified for claim 1 above, and further in view of Domen (US 6,555,403).

Regarding claim 12, Migita as modified above differs from the claimed invention only in not expressly disclosing thickness of said barrier layer.

Domen discloses a semiconductor light emitting device and teaches thickness of said barrier layer (col 53 ln 47-48, 56, 60, 63) is at least 5 nm and at most thickness of said active layer (col 52 ln 27-31).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that thickness of said barrier layer is at least 5 nm and at most thickness of said active layer; at least to use a know and suitable thickness.

Regarding claim 27, Migita as modified above discloses said barrier layer is of a II-VI group semiconductor.

Migita as modified above differs from the claimed invention only in not expressly disclosing the material of the barrier layer.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the barrier layer using ZnMgBeSe; at least to use a known and suitable material.

Migita as modified above differs from the claimed invention only in not expressly disclosing thickness of said barrier layer.

Domen discloses a semiconductor light emitting device and teaches thickness of said barrier layer (col 53 ln 47-48, 56, 60, 63) is at least 5 nm and at most thickness of said active layer (col 52 ln 27-31).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that thickness of said barrier layer is at least 5 nm and at most thickness of said active layer; at least to use a know and suitable thickness.

Response to Arguments

Applicant's arguments filed 01/30/2007 have been fully considered but they are not persuasive.

Arguments based on the restriction requirement are not convincing, although the patentable distinction is a factor in determining obviousness, it does not outweigh the modifications made, those modifications resulting in the claimed invention.

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Remaining arguments are directed against the references individually. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See MPEP § 2145(IV).

The deficiencies of each individual reference are eliminated in the combination relied upon, and all modifications necessary to arrive at said combination are obvious and motivated properly as laid out in the above rejections.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

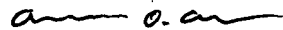
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew O. Arena whose telephone number is 571-272-5976. The examiner can normally be reached on M-F 8:30-5.

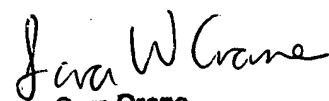
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard T. Elms can be reached on 571- 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Andrew O Arena
16 April 2007



Sara Crane
Primary Examiner